THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

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VOLUME XXI.—No. 9.) Whole No. 369. } NEW YORK, MONDAY, NOVEMBER 2, 1874. {$3 PER ANNUM IN ADVANCE.

Second Annual Meeting of the American Gas-Light Association.

HELD AT THE POLYTECHNIC INSTITUTE, BROOKLYN, N. Y., OCTOBER 21ST AND 22D, 1874.

MORNING SESSION OCTOBER, 21st, 1874.

The Association was called to order at 10 A. M., by the President, General Charles Roome.

The minutes of the previous meeting were read by the Secretary, and, after correction, approved.

The Secretary read a communication from Theobald Forstall, Esq., dated New Orleans, Oct. 17, 1874, which was ordered on file.

The Secretary read a communication from Colonel R. C. Ward, of the 23d Regiment, N. G. S. N. Y., inviting the members of the Association to visit the armory of the Regiment. The Association accepted the invitation, and voted to go in a body at 7 30 P. M.

The Secretary called roll, when the following members answered to their names:

CALIFORNIA.

W. W. Beggs, San Francisco.
Chas. H Simpkins, Marysville.

CONNECTICUT.

Jno. P. Harbison, Hartford.
F. E. Harrison, New Haven.
Henry Cartwright, Bridgeport.
L. C. Hanford, Norwalk.

DELAWARE.

Thomas Curley, Wilmington.
Thomas J. Lawson, "

GEORGIA.

George S. Hookey, Augusta.

INDIANA.

H. Stacey, Indianapolis.
Wm. Dunbar, New Albany.
H. M. Edgerton, Fort Wayne.

IOWA.

J. N. Coldren, Iowa City.

MASSACHUSETTS.

George D. Cabot, Lawrence.
H. F. Coggshall, Fitchburg.
George B. Neal, Charlestown.
George Dwight, Springfield.
O. E. Cushing, Lowell.
L. D. Rhodes, Holyoke.
E. N. Snow, Chicopee.
F. C. Sherman, Worcester.

MICHIGAN.

Samuel Lewis, Detroit.
P. E. DeMill "

NEW JERSEY.

John S. Chambers, Trenton.
Joseph P. Gill, Newark.
W. L. Williams, Paterson.
John W. Bates, Hoboken.
George W. Edge, Jersey City.

NEW YORK.

General Charles Roome, New York city.
J. Herzog, " "
J. R. Floyd, " "
P. W. Stebbins " "
Charles Nettleton, " "
J. Balmore, " "
George Olney, " "
J. Elliot Condict, N. Y.
T. F. Rowland, Brooklyn.
William P. Libby, Brooklyn.
Jos. W. Beatley, Brooklyn.
W. H. White, "
C. H. Stoddard "
J. H. Armington, "
F. S. Benson, "
H. P. Morgan, "
C. A. White, "
F. P. Bunker, "
Jas. How, "
W. R. Beal, Mott Haven.
G. T. Sutton, Peekskill.
Wm. Cartwright, Oswego.
Thos. C. Carroll, Yonkers.
Benson Ferris, Tarrytown.
E. N. Leavenworth, Syracuse.
H. A. Brooks, Albany.
Jno. H. Cowing, Buffalo.
Wm. Humphrey, Lansingburgh.
Isaac Battin, Albany.
Matt. Cartwright, Rochester.

OHIO.

Gustavus A. Hyde, Cleveland.
W. H. Miller, Columbus.
Jas. Light, Dayton.
R. R. Dickey, "
Jos. Clegg, "

PENNSYLVANIA.

Marcus Smith, Wilkes-Barre.
W. H. Denniston, Pittsburgh.
W. H. McClelland, Pittsburgh.
Dr. Hostetter, "
P. Munzinger, Doylestown.
J. D. Patton, Trevorton.
W. W. Goodwin, Philadelphia.
T. R. Brown, "

RHODE ISLAND.

A. B. Slater, Providence.

VIRGINIA.

Chas. S. Allmand, Norfolk.
Wm. H. Baxter, Petersburg.

CANADA.

T. Littlehales, Hamilton.
F. W. Gates, "
E. S. Cathels, Montreal.

DISTRICT OF COLUMBIA.

Geo. A. McIlhenny, Washington.

General Charles Roome, President of the Association addressed the meeting as follows:

Gentlemen—I did not come here with any prepared address. I presume it is known to most of you that a year ago, broken down in health, I was unable to attend your meeting in New York, and I was obliged to go from home and travel in Europe. I was away all through last winter and until the ensuing summer. I do not know, speaking to gentlemen of the intelligence of those now sitting before me, and engaged in such an important business as we are, that you need any very formal address.

Who are we? what are we? and why are we associated? According to the constitution as it exists, we are to meet for the purpose of consulting together that we may advance the interest in which we are all so deeply interested. An interest, the object of which is to promote the welfare of mankind and the comfort of every one. That which was years ago a luxury, has become now almost a matter of prime necessity. Our business is purely a scientific one. It is reduced to mathematical certainty. Experiments are made, and costly experiments they are, as you well know. Our object is therefore to benefit those for whom we work, and upon whom we depend. According to our constitution we are each to tell the other what we know of the business, we are to have no secrets each from the other. Our works are open to public inspection, and the experiments we make, and which may be recorded here, are the common property of this Association and all who sustain it. Our object is therefore a good one. Of course we are not, and do not pretend to be, a charitable Association. We are spending our own money; we are devoting our time and our studies for what? That we may receive a fair return for that which we invest, and at the same time it is to the interest of the public to sustain us, for in sustaining us they are promoting their own comfort.

It is not an antagonistic business. It is a business the prosperity of which depends altogether upon the manner in which it is managed. If it is mere guess work, empirical, it will amount to nothing. That day has gone by in our business. The time has come when all we do must be mathematically demonstrated, and so we provide at great expense in our works, the means of ascertaining that which will produce the best light for the public at the cheapest cost to us, and consequently cheapest to them. Our interests and those of the public are identical. There is, as you all know, a strong prejudice against any chartered company, newspaper editors and reporters especially having no mercy on such a corporation. They call them monopolies.

Now, there is not the first feature of a monopoly in our business. In the State of New York any five men can in 20 minutes form a gas company, and getting the consent of the local authorities, can lay their gas pipes anywhere. Is there any monopoly in this?

And yet these gentlemen are pleased to call us monopolists.

Gentlemen, we are engaged in a laudable, honorable, and useful business. We are engaged in a business which must succeed. The world cannot do without it, and we must so manage it that we may gain credit to ourselves. We are trustees. Millions on millions of dollars are entrusted to our care. We must manage carefully or our offices will be taken from us, and we must do as wise and honest men should do, discharging a sacred trust to those whose means are placed in our hands, and to the public on whose favor we depend. We propose to collect for the information of the members, the laws of the different States applicable to our profession, to enlighten legislative committees and others interested, as to the real nature of our business and the modes of conducting it; and although we shall be compelled to repeat over and over again the same old story, we must be patient, for the charges against us are stereotyped, and arise from ignorance of those who not possessing the necessary scientific information are incapable of understanding what they undertake to condemn. I have been before committees of legislatures and of Congress, and for the last thirty or forty years have had to answer the same old charges, and with the same arguments; and so will it be with you, gentlemen, wherever you may go, and as long as you may live. "*Magna est veritas et prevalebit.*" Truth will prevail. But you can make it known only by incessant labor. You must not grow weary. You must listen to the same old story. "My bill was highest where I burned the least. There is no evidence whatever that I burned this gas; your meters amount to nothing." Gentlemen, has not the law thrown around the consumers every protection which can be given. Are we not compelled to use the measure which the State Inspector declares to be a correct measure? And do we not know among ourselves, that there is no article of commerce which is more accurately measured and supplied to the public than illuminating gas. Gold and silver are not more carefully dealt out to them than the gas which is burned in the houses and places of business in this and every other city. We know it. Our customers frequently doubt it. How then can we convince them? What evidence can we give—what security can we afford? There is a gentleman on this floor who was one of those who framed the law which was adopted by the State of New York, and which gave to the public every possible protection. I know the gas meter is a correct measure. I have proved hundreds of meters with mo own hand when I was the engineer of my company years ago, and I can say as you can say, without fear of contradiction, that there is no measure on the face of the earth more accurate than the gas meter which is used by the gas companies of the United States this minute. (Applause.)

Gentlemen, ours is a progressive science. It is idle for us to sit down and say that all we have to do is simply to throw the coal into the retorts and take the gas out. Ours is a business which requires a study and the possession of scientific knowledge. That scientific knowledge we are laboring to possess. We pay for intellect and we use intellect, and the public, as well as ourselves, get the benefit of it. It is to our interest to sell gas at as low a rate as we can afford. "Reduction in price causes increased consumption; increased consumption produces increased profits; increased profits enable prices again to be reduced, thereby benefitting both producer and consumer." It is a system of mutual dependence between gas companies and gas consumers. I was somewhat old in the business before many of you were born, for it is now thirty-seven years since I commenced my profession. Gas was then sold in this city for $10 per 1000 cubic feet. We make more money at $2.75 per 1000 cubic feet than we made at $10. Why is this? Because of improvements in our mode of manufacture. I do not know that it is necessary for me to say anything further than this. Scientific papers will be presented to you. Men here, much younger than I am, who are studying hard, will present their views to you, and aged men who have experience in this business will give you the benefit of their experience. But as we are all working together for the common good—for the good of the companies we represent—and representing the companies, for the good of the public at large, we can do so in perfect confidence. Let us have no secrets from each other—no secrets from the public. When we give them light, let us give them all the light we can, whether it is in our mode of management or in the simple burner through which they feel our pulse.

Gentlemen, I wish you all success. (Applause.)

The secretary read a communication from Samuel H. Douglass, of the University of Michigan, dated October 3rd, 1874.

Also a communication from P. E. Pebble of Quebec.

Also a communication from the Historical Society of Brooklyn, inviting the members of the Association to visit the library of the Society. The invitation was accepted.

Also an invitation from the Nassau Gas Light Company, inviting the members of the Association to visit their works. The invitation was accepted.

Mr. Libby, President of the Citizens Gas-Light Company of Brooklyn, also invited the members of the Association to visit their works, which invitation was accepted.

Mr. James How, Vice-President of the Brooklyn Gas-Light Company, on behalf of all the gas companies of Brooklyn, invited the members of the Association to take a ride to-morrow and view the Park, Greenwood, and other interesting portions of the city. Also to visit the Art Gallery. Also to partake of a lunch at 3 o'clock to-day. All of which invitations were accepted by the Association, with thanks.

Mr. How also invited the members of the Association to inspect the rooms of the Polytechnic Institute.

Mr. Nettleton, from the committee appointed to revise the Constitution and By-Laws, reported the following amended Constitution and By-Laws:

CONSTITUTION.

I. The name of the Association shall be the American Gas-Light Association, and its office shall be in the city of New York.

II. The objects of this association shall be, the promotion and advancement of knowledge, scientific and practical, in matters relating to the construction and management of gas works and the manufacture, distribution and consumption of illuminating gas, to the end that its cost may be cheapened and its consumption increased.

III. The establishment and maintenance of a spirit of fraternity between the members of the association, by social intercourse, and by friendly exchange of information and ideas on the before mentioned subject matters.

IV. The inducement and extension of more cordial and friendly relations between the manufacturers of illuminating gas and their patrons, based upon mutuality of interests and a recognition by both of the fact, that each have rights which the other should respect.

V. The members of this Association shall consist of two classes, active members and honorary members.

VI To be eligible as an active member a person must be a president, vice-president, director, treasurer, engineer, consulting engineer, or superintendent of a gas company, or an individual manager of a gas works, or a person practically skilled in the construction and management of gas works.

VII. Honorary members shall be gentlemen whose scientific or practical knowledge in matters relating to the gas industry, and whose efforts and interests in that behalf shall recommend them to the Association.

VIII. Every applicant for active membership shall signify the same in writng to the secretary, addressed to the association, endorsed by two active members.

IX. Honorary members shall be proposed to or by the Executive Committee, and notice thereof shall be given by the secretary to the association for its action. The election of applicants for active membership, and of persons proposed as honorary members shall be by ballot, and each person shall receive two-thirds of the vote cast to be elected.

X. New members shall be formally introduced to the Association by the presiding officer after being elected, when they shall subscribe their names to the Constitution of the association in a roll book of the same, and they shall each, at the same time, receive a copy of the Constitution and By-laws of the Association.

XI. If any applicant for membership or person proposed for membership, on being balloted for, be rejected, no notice shall be taken of the application or action on the same, in the minutes.

XII. The affairs of the Association shall be managed by an Executive Committee, subject to the control of the Association, by its action in general meetings. The Executive Committee shall be composed of the officers of the Association for the time being, and the president or acting president for the last preceding year. All questions in Executive Committee shall be decided by a majority vote, and five members shall be a quorum.

XIII. The officers shall consist of a president, three vice-presidents, treasurer and secretary, to be elected annually, six members of Executive Committee, and three members of Finance Committee.

XIV. The officers of the association shall assume office immediately after the close of the meeting at which they are elected: they shall hold meetings at the call of the President—or in his absence, at the call of the vice president—and make arrangements for carrying out the objects of the Association.

XV. The president, or in his absence, one of the vice presidents, shall preside at all meetings of the association and executive committee at which he is present.

XVI. The duties of the treasurer shall be to receive and safely keep all annual dues and funds of the Association; to keep correct accounts of the same, and pay all bills approved by the president or a member of the finance committee; and he shall make an annual report to be submitted to the Association.

XVII. The duties of the secretary shall be to take minutes of all proceedings of the Association, and of the executive committee, and enter them in proper books for the purpose. He shall conduct the correspondence of the Association; read minutes and notices of all the meetings, and also papers and communications, if the authors wish it, and perform whatever duties may be required in the constitution and by-laws appertaining to his department.

XVIII. The finance committee shall meet on the day of each annual meeting of the Association, at least one hour before the opening of the meeting, to receive from the treasurer a statement of his accounts, and audit the same.

They shall hold such other meetings from time to time as the interests of the Association may require.

XIX. The annual meeting of the Association shall be held in the City of New York, on the third Wednesday of October of each year. Other general meetings of the Association may be held at such times and places as shall be directed at the previous annual meeting.

XX. At the annual meeting of the Association the order of business shall be:

1. The reading of the minutes of the last meeting.
5. The reading of applications, notices, and reports for new membership.
3. The election and introduction of new members.
4. The address of the President.
5. The report of the executive committee on the management of the Association during the previous year.

6. The report of the treasurer.
7. The report of finance committees.
8. Reports of special committees.
9. The election of officers.
10. The reading of papers of which notice has been given to members by the secretary and discussions upon the same.
11. General business.

XXI. At other general meetings of the Association, the order of business shall be the same, except as to the 5th, 6th, 7th and 9th clauses.

XXII. The secretary shall send notices to all members of the Association at least fourteen days before each general meeting, mentioning the papers to be read, and any special business to be brought before the meeting.

XXIII. The executive committee shall meet one hour before each general meeting of the Association, and on other occasions, when the president shall deem it necessary; of which special meetings, reasonable notice shall be given by special call in print or writing, specifying the business to be attended to.

XXIV. All questions shall be decided by any convenient system of open voting, the presiding officer to have a second or casting vote when necessary.

XXV. Questions of special nature shall be decided by ballot.

XXVI. Any member, with the concurrence of the presiding officer, may admit a friend to each meeting of the Association, but such person shall not take any part in the discussion unless permission to do so be given by the meeting.

XXVII. All papers read at the meetings of the Association must relate to matters either directly or indirectly connected with the objects of the Association, and must be approved by the executive committee before being read, unless notice of the same shall have been previously given to the members by the secretary.

XXVIII. All papers, drawings or models submitted to the meetings of the Association, shall be and remain the property of the authors.

XXIX. Active members shall pay an initiation fee of ten dollars, and the sum of five dollars annually thereafter, which shall be paid in advance.

XXX. No member, whose annual payment shall be in arrears, shall be entitled to vote.

XXXI. Honorary members shall not be required to make any payments or contributions to the Association.

XXXII. Any member may retire from membership by giving written notice to that effect to the secretary, and the payment of all annual dues to that date, but he shall remain a member and liable to the payment of annual dues till such payments are made.

XXXIII. Any member may compound for his annual payments by paying fifty dollars in one sum.

XXXIV. A member may be expelled from the Association by a report and motion to that effect made by the Executive Committee at any general meeting of the Association; the vote shall be by ballot and shall require two-thirds of the votes cast for its adoption.

AMENDMENTS.

XXXV. All propositions for adding to or altering any of the provisions of the foregoing Constitution, shall be laid before the Executive Committee, who may bring it before the next general meeting of the association, if they think fit, and such committee shall be bound to do so on the requisition in writing of any five members of the association. Each member of the association shall, upon request, be furnished by the secretary with a copy of the Constitution and By-laws of the Association, and also a list of the names and residences of the members.

On motion the President appointed as a committee for the purpose of engrossing the Constitution Messrs. Nettleton, Neal, Harbison, Leavenworth, and Clegg.

On motion, it was voted that the secretary transmit a copy of the Constitution as amended to each member of the Association, also a copy of the proceedings of the Association.

Mr. De Mill—Mr. President: I desire to return my thanks for the kindness I have received from the starting of this Association in 1872 to this date. Everything has gone on pleasantly from the first meeting which we held in Cleveland. All of the papers which have been presented to the Association are here at our feet; also minutes of all the transactions that have occurred from that day to the present moment. I have my report here which I am ready to deliver over, of all the moneys I have received, and all the moneys I have paid—the balance is in my pocket. There is one thing that I have not done. I have charged for my services, on account, $100. At the first meeting in New York we paid the secretary then $500, and his agent or assistant the sum of about $80. I am not here arguing to get a fee at all, but for the gentleman who may succeed me, and that the Association may have some idea what I think he should be paid for his services, whoever he may be. I have the impression that from $250 to $300 ought to be quite sufficient at this early stage of the Association. That might not pay for the room that it is now necessary to have. You must have some place to keep these papers. You must have some place so that we can get at the papers when we come to attend the meetings of the Association. All the papers that have been read before the Association are now on file and can be had; and if it is deemed important to print them—and I believe they ought to be printed, every one of them, for the benefit of the Association—that would incur some little additional expense. Still I think there will be a sufficient number in the Association now, so that the present fee which we have adopted with this Constitution, will pay all the expenses beyond any contingency. Any person, individual, or company that makes an application here for membership has got to pay $10. After that the companies that are represented here and the individuals pay $5 annually. That, it seems to me, will cover all the expenses that need to occur for the next five years at least. I would like very well to have the President refer my report of the moneys that I have received to a committee to report back here this afternoon, that we may act upon it; and I think there ought to be such a committee appointed to examine the report of the treasurer. Having held the office of Vice-President and Secretary and Treasurer without my consent, I feel very grateful for the intercourse I have had with the members, and they will please excuse me if I decline any further services in that direction. I think we can elect in New York, without any difficulty, a man who is fully posted—and I shall not hesitate to name him—who will take good care of the interests of the Association, and we can have access to his place, and that is Mr. Charles Nettleton.

Mr. Harbison—Mr. President: I think that what I said when we were discussing the articles of the Constitution, and the fears I expressed in regard to this matter are very fully verified by the gentleman's remarks. He says now that it will be necessary to have an office in the city of New York, where all these papers shall be kept on file, accessible to the members who come here; and he also suggests that it will be necessary, as there will be so much work to do, to pay an annual salary of from $250 up to as many thousand to the secretary to attend to the business. I have understood from some gentlemen who are present, that the present secretary volunteered his services some time ago as secretary of the Association, and I suppose there are members of the Association who would be willing to do the business for a year or two at a time, and not expect to receive all the annual payments of members for their services; because if there are seventy or one hundred members of the Association at $5 a year, that only brings in an income of $500, and if that amount is given to a secretary for his services, we should have nothing left to print reports or anything else. I think the office of secretary ought not to be a paying office. It is one of the duties of an active member, and when one man has served a certain time, the office should be given to some one else. That is why I was opposed to having the office in the city of New York. The present secretary has done well, but we prevent his being re-elected by the adoption of the Constitution, which says he shall have an office in New York. It turns him practically out of office. I say it is all wrong in principle to pay money to support somebody in office. It may be all right now, but this is only a starting point, and somebody will be fishing for it by and bye. Some one who cannot get a living in New York or New Jersey will be proposed by some gentleman for the office of secretary of the Association.

Mr. Leavenworth raised the point of order that there was no business before the meeting, and moved that a committee of three be appointed to examine the accounts of the treasurer. The motion was carried.

The treasurer then presented his account, and the president appointed as a committee Messrs. Sutton, McIlhenny, and White.

The Association then took a recess until 4 P. M., to partake of the lunch furnished by the gas companies of Brooklyn.

American Coal Production.

The total production of anthracite in 1873 was twenty-two and three quarter million of tons, of which about three and a quarter million tons were consumed in the coal regions, leaving nineteen and a half millions for the market. The demand is estimated to increase annually ten per cent., and taking a series of years together it does increase that much. What it falls short in any one year is usually made up by excess of the estimate the next year following. There is no reason to doubt that there will be market for twenty millions of tons in 1874. What may be new to many of our readers, is that the bituminous coal production is equal to, if not in excess of, that of anthracite. It last year amounted to 22,585,000 tons, and the production of both kinds for the year to 45,413,340 tons.

The total of foreign coal imported during the year was less than half a million of tons, and the amount exported was but about 100,000 tons in excess of the imports. Should the annual increase in the production of anthracite and bituminous coal in the next ten years equal that of the last ten years, the production to be marketed for consumption in 1883 will reach the enormous aggregate of 95,000,000 tons! And there is no reason furnished in the past history of the trade, either here or in England, to doubt that it will so increase. With such an increase in the production of coal, how do the present facilities for marketing it stand in comparison? Those who sometimes express fears that the coal carrying companies are laying out too largely in the future in this business, may be perhaps somewhat assured in contemplating the existing situation, and comparing it with so near a future as only ten years.—*Philadelphia Ledger.*

Fluorescence and Photography.—Gladstone recently called attention to some photographs of fluorescent substances. Fluorescent substances, such as bisulphate of quinine or uranium glass, have the power of altering the refrangibility of the violet or chemical rays of light; hence, although paper painted over with bisulphate of quinine will look nearly white, it will appear in a photograph as if it were nearly black. Dr. Gladstone exhibited some photographs of ornamental designs traced on white paper with bisulphate of quinine; although the designs were nearly invisible to the eye, in the photographs they were boldly visible. A colorless solution of bisulphate of quinine was placed in one glass, and some ink in another glass; when both glasses were photographed they came out equally black. Dr. Gladstone said that once, at the seaside, he painted a pattern with bisulphate of quinine upon paper, and took the paper to a photographer to be photographed; he objected, because there was nothing on the paper, but on trying the experiment he found out his error. It was stated that some kinds of varnish possess a similar power of affecting the refrangibility of light.

Chemical Repertory.

No. 121.—November 2, 1874.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1271. Great French Work.—The draining of the rivers Adour and Echez, in the department of the Hautes-Pyrenes, S. W. France, is a work of great importance to the neighborhood, and the Minister of Public Works has offered to advance half the amount necessary if the department will find the rest, which it is ready to do. The work includes two canals of derivation, channels for distribution of water, and a reservoir to contain 14,000,000 tons. The cost is estimated at nearly 7,000,000 francs. The necessary preliminaries are now being taken to arrange the division of the costs between the communes.—*Iron.*

1272. Liquid Death in New Jersey.—A letter to a Jersey City paper calls the "attention of the Mayor, Common Council and Fire Department, to the sale and use of a material called De Soto, as a light among the poorer classes. It is sold by Mr. Reynolds, on Newark avenue, who claims the exclusive agency and sale of the material. He sells from the same can or receptacle gasolene, naphtha, spirit gas and De Soto, as the customer may wish. It is a very light, volatile substance, and exposes not only the property but the lives of our citizens, and vitiates all policies of insurance thereon. Our laws and ordinances prohibit its use or sale, and our officials must now do their duty and prevent the farther use or introduction into the city."

1273. The Staff of Life.—In a recent work, F. R. Eaton condemns the "finest white bread" so much in request in modern times as not merely deficient in gluten and in the natural salts of wheat, but as tempting the baker to the use of alum. It is remarkable that not a few of the most dangerous adulterations spring from introducing the idea of color into our kitchens and our dining-rooms. Alum, the author considers, tends especially to produce constipation. The alum in bread, however, is always accompanied by an excess of the phosphate of potash, present in the wheat. Hence we may infer that double decomposition will ensue during digestion, the alumina combining with the phosphoric acid to form the insoluble phosphate of alumina. This then, is, in our opinion, the great objection to the use of alumised bread, that a considerable portion of the phosphoric acid in our food is thus rendered unavailable.

1274. A Fire-Extinguisher for Ship-board.—A fire-extinguisher at sea, which will perform its work efficiently, has long been a desideratum with the owners of vessels. Messrs. Paton & Harris, of Glasgow, believe they have succeeded in supplying this want by their "Pyroletur, or Fire Destroyer," a contrivance by means of which the hold of a 1200-ton ship can be filled with an anti combustion gas in less than twenty minutes. The gas—carbonic acid—is prepared on deck by means of a light, portable force pump, and the compound is forced through a tube to the bottom of the ship's hold. In the "separator," which is fitted to the keelson, the gas is set free to do its work by expelling the lighter common air through apertures in the deck, which have been left open for its escape.

1275. A Steam Generator.—By Prof. W. B. Trowbridge.—When heat is transferred from one gas or fluid to another, through an intervening metallic plate, the quantity of heat transferred in a given time depends on difference of temperature of the two fluids. The greater this difference, the greater is the quantity of heat transferred in a given time. This principle makes a circulation of both fluids necessary in order to obtain the maximum result. The circulation of the water in the steam generator has heretofore been left to chance effects of difference of specific gravity, a slow natural circulation being the result. The object of the paper was to explain by diagrams and otherwise a construction in which the heating surfaces are the surfaces of small pipes, and the circulation is a constant one by means of a circulating pump. Experiments have been made to demonstrate the efficiency of the apparatus.—*Amer. Association at Hartford.*

1276. Natural Gas as Fuel.—In ours of July 29, we referred to the fact that Messrs. Rogers & Burchfield at Leechburg, were using natural gas in iron-making. We now learn by an exchange that the Erie Rolling Mill, which we believe is an old Pittsburgh institution transplanted, are running three heating and five puddling furnaces with gas, produced from three small wells on their property. These wells are about three inches in diameter and two hundred and fifty feet deep, and are sunk in different parts of the land belonging to the works. In all three the gas was struck at the same depth, showing that there is a reasonable probability of finding gas on every part of the property. We believe the gas is stored in a large oil tank, from which it is drawn as needed.—*Exchange.*

1277. Determination of Sulphur in Coal and Coke.—The following process is given by Eschka, in the Oesterr Zeitscher, 1874, p. 211: One gramme of the substance is to be ignited for from three-quarters to one hour, with one gramme calcined magnesia and 0·5 gramme anhydrous carbonate of sodium in a platina crucible so inclined as to allow access of air for consuming the carbon, the contents being frequently stirred up for the same purpose. The residue, when cold, is rubbed, while still in the crucible, with from 0·5 to one gramme of nitrate of ammonia, using a glass rod, after which the crucible is covered with the lid and and again heated for five to ten minutes, when, upon cooling, it is dissolved in 200 c. c. hot water, which is evaporated to 150 c. c. and filtered. The filtrate is then acidified with a few drops of hydrochloric acid, and the sulphuric acid in the solution precipitated by chloride of barium, and determined as usual.—*Iron and Steel Institute.*

2278. Temperature of the Sun.—M. J. Violle described to the French Academy of Science his apparatus and methods, and concludes that the temperature of the sun at Grenoble, on June 20, at 3.30 P. M., was 1354°. Concerning the above researches of M. Violle, H. Saint-Claire Deville remarks that it is not prudent to speak of temperatures above those which have been measured, the highest of which probably has been determined by the experiments of Bunsen. In speaking of calorific phenomena produced by combination we must remember that, in given conditions of temperature and pressure, the quantities of matter which combine, and consequently the amounts of heat produced, are limited by the phenomenon of constant dissociation—a limit which the speaker's experiments place very near to measurable temperatures. It is, therefore, not permissible, until the contrary has been demonstrated, to speak of those fabulous temperatures which have often been mentioned.

1279. Poisonous "Mineral Waters."—A correspondent of *Iron* writes as follows (applying just as well in this country): "There is no doubt that oftentimes there is 'death in the soda-water bottle.' Many persons seeking an occupation, or tempted by the advertisements of so-called 'Soda Water Machinery' makers, enter the trade with insufficient capital and an utter ignorance of its rudiments. They are told 'it requires no previous knowledge.' A stable or shed is taken; the water most convenient is collected in a lead cistern, passed in an unfiltered condition through lead pipes into a copper cylinder, then charged with gas—often as impure as the water—and being bottled off, is labelled 'soda-water.' I express the wishes of many experienced manufacturers who desire to see the sanitary board of every town armed with authority to examine all manufactories of aerated waters, inflicting penalties where proper sanitary precautions are neglected. The inquiries and experiments of the *British Medical Journal*, a few years ago, on this question, were confined to manufacturers in London alone. This suggestion would go far to protect those who have invested large capital to enable them to produce pure and reliable articles, and who are now subjected to the most unfair and reckless competition.

1280. High Temperatures.—Berthelot remarks that the existence of high temperatures as a general principle, and the possibility of realising them, must be carefully distinguished. Our present theories indicate that a given gaseous mass may acquire a *vis viva* indefinitely increasing—that is to say, an unlimited temperature, at least as far as simple gases are concerned, and as long as we do not throw any doubt upon the absolute character of the laws of Mariotte and Gay-Lussac. With this reservation there would be no other limit conceivable than that which would correspond to the destruction of our present elements, or into an universal ethereal matter. But, in fact, it may be that the intensity of the radiations of every kind augments with an extreme rapidity as the temperature rises, that consequently the loss of *vis viva* which communicates itself to the surrounding media, becomes more and more considerable. Thus the realization of every temperature exceeding the limit bordering on 2000° or 3900°, observed in the experiments of Sainte-Claire Deville, is rendered impracticable.—*Academy of Sciences.*

1281. The Universal Plenum.—Physicists recognize heat as a mode of motion, and that it comes under the cognizance of our perceptions by the vibrations of atomic matter or ether; of ether, that fluid material, perfectly elastic, incoercible, imponderable, which fills all the immensity of space and the depth of all bodies. It is in this fluid that the stars describe their orbits; in this fluid atoms perform their movements and describe their trajectories. Thus the ether, the radiant messenger of heat and light, conveys and distributes their radiations through all the Universe; and that which it loses in vibratory energy when it penetrates a cold body, which it warms, it communicates to the atoms of this body, and augments the intensity of their movements; and that which it gains in energy by contact with a warm body, which it cools, it withdraws from this body and diminishes the intensity of their vibratory movements. And this kind of light and heat which comes from material bodies is transmitted across space to other material bodies.—*Adolphe Wurtz.*

1282. Measurement of the Chemical Action of Solar Light.—Dr. T. L. Phipson, F. C. S., in a note to the *Chemical News*, says: Many years ago I made some experiments on this subject in Paris, and described a method which I believe capable of giving more accurate results than any hitherto obtained. Having discovered that a colorless solution of molybdate of ammonia in sulphuric acid became greenish blue when exposed to the sun, and colorless again during the night, and that the amount of chemical action exerted to produce this tint may be accurately determined by a dilute solution of permanganate of potash, it suffices to operate always upon the same quantity of substance, and to expose it to the light for the same period of time, and in every respect in the same conditions, in order to possess a perfectly accurate process by means of which the problem of the chemical intensity of solar light may some day be solved in a completely satisfactory manner.

1283. A Mexican Cave.—By Porter C. Bliss.—It is said that the cave of Cacahuamilpa is the largest cave in the world. Several persons who have visited the Mammoth Cave of Kentucky and that of Cacahuamilpa in Mexico, pronounce the latter the larger. A volcanic mountain with an extinct crater covers this cave. It is not described in guide-books or books of travel. It has in fact never been adequately described. Mr. Bliss has twice examined and explored it, the last time in February of the present year. Six hundred

persons constituted the last exploring party; they were provided with Bengal lights and scientific appliances. After reaching a level at perhaps fifty feet depth they proceeded 6,000 meters into the interior. The roof was so high—a succession of halls—that rockets often exploded before striking it. Labyrinthine passages leave the main hall in every direction. Stalagmites and stalactites are abundant. Below this cave at a great depth are two other immense caves, from each of which issues a branch of a great river, uniting here. These two rivers enter some five miles distant at the other side of the mountain, flow parallel, and issue at last together. Vast quantities of bats are the most numerous inhabitants of these caverns.—*Amer. Association at Hartford.*

1284. British Gas-Patent.—W. Richards, Burton Road, Brixton, Surrey.—Regulating supply of liquids for the manufacture of gas, etc.—The first part refers to regulating the supply of water or steam or controlling the production of hydrogen and other gases commonly known as "water gas" when used for combination with gas derived from the distillation of liquid hydrocarbons, which is effected by the use of cylinders and pumps worked by steam or water, and made to deliver regular quantities of steam and hydrocarbons to the respective retorts. The second part relates to the supply of water or steam for the production of gases to be mixed with gases derived from the distillation of solid hydrocarbons. This is effected by a pump connected with the station-meter shaft, which pumps the necessary quantity of water or steam into the retorts to produce the requisite hydrogen. The third part relates to the supply of hydrogen by means of pumps actuated by steam, water, or the station-meter, so as to deliver the hydrogen at the bottom of a carburettor, while liquid hydrocarbons are supplied at the top of the same vessel. The fourth part consists in the application of cylinders and pumps for the purpose of pumping and forcing atmospheric air and liquid hydrocarbons into carburetters when air is used in the place of hydrogen.

Influence of Barometric Pressure on Life.

By M. Bert.

He had shown that animals subjected in closed vessels to pressures betwen two and ten atmospheres died from poisoning by carbonic acid, which they themselves produced. He has further studied these toxical effects.

For sparrows, the law was that the animals died when the centesimal proportion of carbonic acid in the air, multiplied by the number of atmospheres, gave a product varying from 24 to 28. The same figure is obtained, and the same symptoms occur, when a sparrow dies in an atmosphere at normal pressure, and sufficiently rich in oxygen for the animal to have always enough at its disposal.

Accordingly, with a view to studying the effects in question, he made dogs breathe in a caoutchouc bag containing about 50 litres of super-oxygenated air at ordinary pressure. Death took place in four or five hours, when the air of the bag contained 35 to 45 per cent of carbonic acid.

The phenomena were, briefly, as follows:

1. The arterial blood contained abundant oxygen till death (when the gas volume was 10 or 12 per cent that of the blood); the carbonic acid increased, but less and less rapidly; near the end it had reached the large proportion of 110 to 120 volumes, not far from the limit of saturation.

2. The number of respirations quickly diminished, without proportional increase in depth.

3. The pulsations fell still more rapidly, but continued some minutes after breathing ceased. The cardiac pressure was high all along.

4. The temperature fell with wonderful rapidity, being at last in the rectum 24° or 28°, while the surrounding temperature was 15° to 18°.

5. When the arterial blood contained about 80 volumes of carbonic acid, the animal became insensible, except in the eye, which did not lose sensibility till 100 volumes. The animal was quiet throughout.

6. The motor nerves and muscles retained their properties after death.

7. The tissues were charged with carbonic acid; muscles, *e. g.*, which usually contain 15 to 20 volumes of the gas, being found to have about 60. The urine contained even 100. The same phenomena were obtained with compressed air.

A comparative experiment was made as follows: Four sparrows were placed in closed vessels—A in air at six atmospheres, B in super-oxygenated air, C in ordinary air, D in air at ¼ an atmosphere. Analysis showed that 100 grms. of the bodies of these animals contained—A, 35 c.c. of CO_2; B, 36; C, 17; D, 0. D died from simple privation of oxygen, A and B by carbonic poisoning, C by ordinary asphyxia. In ordinary asphyxia, the part played by carbonic acid is to be considered as quite secondary; it does not greatly accumulate in the blood or tissues. It was observed that the maximum of carbonic acid in the blood was attained considerably before death.

With regard to poisoning by carbonic acid, M. Bert makes several remarks. The organism being nearly saturated with the gas, the latter acts on the nervous centres, and causes death by cessation of the respiratory movements. The fact that no convulsive movement preceded death disproves the theory that the general convulsions in asphyxia, hæmorrhage, etc., are due to carbonic acid in excess in the blood or the tissues. They are due to the spinal cord being quickly deprived of oxygen.

From the curve expressing absorption of external oxygen, it appears that during the first hours this absorption is normal and regular, and yet the temperature diminishes; the intra organic oxidations furnishing heat become less intense as the blood and tissues are charged with carbonic acid. The action of carbonic acid formed gradually by the organism itself is very different from that of the gas respired at once. M. Bert has previously shown that, if two young rats be placed, one in carbonic acid and the other in nitrogen, the heart of the latter continues to beat for more than a quarter of an hour, while that of the former is arrested in two or three minutes.

The persistance of the heart beats above referred to, and the maintenance of the cardiac pressure, removing all fear of syncope, appear to M. Bert to deserve the attention of surgeons, with reference to employing, as an anæsthetic, carbonic acid, produced by respiration in a closed vessel. At a moment when there was no danger of the animal's life, one might squeeze its paws, or pinch various members, without calling forth any sign of pain or reflex movement.

The facts hitherto communicated have all related to the animal kingdom. M. Bert has, however, extended his researches to plants.

He commenced with germination, the phenomena of which are closely allied to those of animal life. The seeds he experimented with were those of barley and corn (farinaceous albumen), and of cress and radish (no albumen).

Diminution of Pressure.—**In diluted air, germination is slower as the pressure is less. The difference, as shown in the number of seeds germinating, begins to appear from a pressure of 50 centimetres. The inferior limit at which germination can take place is, for cress, about 12 centims., *e. g.*, that of twenty grains of barley only two germinated. They reached a height of six centims, while those sown at normal pressure measured 12. At four centims. pressure there was no germination.**

The grains thus kept without germination were not killed, but germinated, as usual, when restored to normal pressure.

Experimenting as to whether this disturbance of the germination was due to barometric pressure, or to the tension of oxygen alone, he found:

1. That germination in an air containing little oxygen, but at normal pressure, is less rapid than in ordinary air.

2. That germination under low pressure, but in super-oxygenated air, is as rapid as in normal air at normal pressure.

3. That germination may be obtained at a pressure of four centimetres by employing super-oxygenated air.

4. That the inferior limit of germination observed by Huber and Senebier in air containing little oxygen almost corresponded to that which he had indicated for atmospheric pressure. Germination, according to them, ceased, in lettuce-seeds, when there was about 1-7th of oxygen. Now the 7th of 76 centims. is about 11 centims.; minimum tension for the seeds of cress.

Germination, then, takes place less quickly in expanded air, and this arises from the weak tension of oxygen.

Increase of Pressure.—Analysis of the phenomena shows that action of compressed air is due to too great tension of oxygen. For—

1. Seeds of barley and cress placed in super-oxygenated air at normal pressure behave like those in compressed air. Thus, at about 60 per cent. it is difficult to note any difference; but about 80 or 90 per cent. (corresponding to 4 or 4·5 atmospheres) it becomes evident that the barley seeds are developed very much less than in ordinary air; the cress seeds are less affected.

These facts confirm the results obtained by Huber and Senebier, and which some physiologists have questioned.

2. If super-oxygenated air be employed under pressure, we have, *e. g.*, at a pressure of two atmospheres, for an air with 90 per cent. of oxygen (oxygen tension $2 \times 90 = 180 = 9$ atmospheres), the same results as with 9 atmospheres of air.

3. If compression be produced in air containing little oxygen, so that the tension of this gas does not exceed that of ordinary air at 2 or 3 atmospheres, the germination takes place regularly.

To sum up—

1. With diminution of pressure, germination takes place more slowly the lower the pressure. It ceases finally between four and ten centimetres, without the seeds, thus kept inactive, dying. There is evidently an arrest of the oxidations necessary to development of the embryo, owing to the too weak tension of oxygen.

2. With increase of pressure to 2 or 3 atmospheres, there seems to be a slight advantage for seeds in the compressed air; but, from 4 or 5 atmospheres, there is evident disadvantage, especially to seeds with farinaceous albumen. Lastly, at very high pressures, the seed is killed by being kept in the compressed air; it is also killed when subjected to compression after its development has commenced. This is due to the too great tension of oxygen retarding the oxidations, as in the case of animals. If the alterations in the compressed air be examined, it will be found that the consumption of oxygen has been much less than at normal pressure.

The present communication seems to offer a solution of certain important questions connected with the geographical distribution of plants, etc.—*Chemical News.*

Liverpool Water-Supply.

THE RIVER WYRE SCHEME.

An increased supply of water for the town of Liverpool having become imperative, several schemes have been submitted to the consideration of the Town Council for obtaining it. Amongst these is one for utilizing the resources of the eastern or upper portion of the river Wyre, in North Lancashire, an account of which has just appeared in the *Liverpool Mercury*. The writer says the river Wyre scheme was first brought prominently before the council by Mr. Joseph Jackson, C. E., of Bolton, in his report on the subject of the future water supply of Liverpool presented to the council in May last. **Mr. Jackson, after carefully inspecting the various sources from which it has from time to time been suggested that a supply of water adequate to the future wants of Liverpool might be obtained, came to the conclusion that the river Wyre was the best, and drew out the Wyre scheme.** Under this scheme it is proposed to obtain a supply from the head waters of the river Wyre, which are found in a wide tract of moorland, some 18,000 acres in extent, east of the Preston and Lancashire Railway, and extending to the ridge forming the boundary between Lancashire and Yorkshire. At the southerly end of this land two streams—the Brock and the Calder—rise on what are known as the Bleasdale moors, and running in a westerly direction, become tributaries of the Wyre, the Brock joining the latter river above St. Michael's-on-Wyre, and the Calder joining it above Garstang. The Wyre proper is derived from the moorland north of the Bleasdale moors, and, taking first a southerly and then a westerly direction empties itself into the sea at Fleetwood. It is proposed to take the water of the Brock and the Calder,

with that of several small streams, near to the town of Chipping, which is on the eastern edge of the Bleasdale moors, and also the water of a small district on the southerly side of the Wyre Valley, and impound it all in an immense reservoir, as large as all the Rivington reservoirs together, on the Bleasdale Moor, from which it would be sent to Liverpool, being delivered at the north end of the town near to Walton Church. Some 12,000 acres of land would drain into the Bleasdale reservoir, which, it is estimated at a moderate calculation as to the rainfall (namely, 28 inches available), would be capable of yielding upwards of 20 million gallons per day, provided that instead of giving compensation in water for the streams taken, a money compensation were given. Should a still larger supply be needed, water could be obtained from some 6,000 acres of land to the north, at the head of the valley of the Wyre proper. This would yield an additional supply of ten million gallons daily, giving a possible total from the Wyre district of 30 million gallons per day.

The water yielded by this district, except the small quantity from Chipping, would be similar in quality to the water of Rivington, the geological formation from which it flows being similar. The Chipping water rises in the limestone formation, but the admixture of this with the soft water of the Wyre district would in the opinion of Mr. Jackson, be rather beneficial than otherwise. The distance of the Bleasdale reservoir from Walton church by the route the pipes would have to be laid would be about 40 miles, or 31 to a reservoir at Scarth Hill, Ormskirk, the point at which the pressure would be put on to supply Liverpool. The advantages claimed by Mr. Jackson for the Wyre scheme are—

Its comparatively short distance from Liverpool, and consequently its cheapness; the ample supply that it would yield for many years; and the facilities afforded by the formation of the district for impounding the water in one reservoir. The estimated cost of the scheme proper is £1,670,518; or to obtain the additional water which might be brought in from the head of the Wyre Valley, £226,583 more, making a total of £1,906,101. This sum is much below the estimated cost of the Windermere scheme, which is the next in favor with Mr. Jackson to the Wyre scheme.

The site of the proposed reservoir is eminently suitable for the purpose to which it is to be devoted. The hills just here form a rough half circle, and it is proposed to construct an embankment to close in the open side, and so make the reservoir. The greater part of the work necessary for the construction of an immense natural reservoir here has already been done by nature, and the engineers have simply to finish it. An idea of the great size of the proposed reservoir will be obtained when it is stated that it will enclose a body of water almost a mile square. The embankment will, in the highest parts, be 110 feet in height, and the reservoir will cover some 550 acres, and be capable of holding 3750 million gallons of water. The land on which the reservoir is proposed to be constructed is from 1,500 to 1,700 feet above the level of the sea, so that the water will travel to Liverpool by gravitation. This, of course, renders pumping, which was a very serious item in the estimates of the Windermere scheme, unnecessary. The proposed reservoir will take in part of the valley of the river Brock, which will, therefore, flow into it naturally. The water of the river Calder, which is to the north of the north of the Brock, it is proposed to bring into the reservoir by a conduit; and similar means will be taken to get into the reservoir the water from Chipping.—*London Journal of Gas-Lighting.*

Improved Injector.

It is well known to any who may have had experience in the working of injectors that they are most eccentric in behaviour and difficult in management. That it is almost hopeless for a stranger to any injector to think that he can put it in action or without considerable judgment and care, get it to work when he wishes. This is caused principally by the fact that the admittance of the water and steam is regulated by two separate handles. The flow of water and steam have thus to be adjusted both to a certain ratio to one another, and at the same time that their united volume shall fill the capacity of the injector. This at once points out the difficulty of adjustment. The water and steam may by trial be adjusted to the proper ratio, but still not be of sufficient volume to fill the injector. In endeavoring to alter the volume the proper ratio is destroyed; and so on, in the most vexatious manner possible. A Frenchman, M. Ferrero, deserves great credit for his latest improvement in injectors. His improvement is simply this: That he causes the united volume of steam and water to be always obligatorily right to suit the injector, and the adjustment of ratio one to another is caused by a single movement. This deprives the injector of its principal complication, and makes its adjustment perfectly easy and simple.

He effects his result mechanically in this way: In the ordinary injector the steam-jet is adjusted by a solid cone in the centre, and the water-flow adjusted by the second hollow cone through which the steam flows, and with which the steam cone moves without alteration, so that whatever the steam may be adjusted to first, the water adjustment must be made afterwards, or *vice versa*. M. Ferrero fixes the innermost and outermost cones so that the mixed volume of steam and water between them is always constant. He adjusts the ratio of steam to water by a movable cone between the other two, which, with a single movement, both increases the water and checks the steam, or checks the water and admits steam. The outermost cones being fixed, ensure that when once the ratio is adjusted, the volume is right. This improvement bears the great stamp of success—simplicity.—*Iron.*

New Method of Utilizing all the Products of the Distillation of Combustible Matters.

By D. C. Knab.

[Translated from the *Journal de l'Eclairage au Gaz.*]

According to the methods at present adopted in carbonizing or distilling coal, the average production of illuminating gas is from 250 to 300 cubic metres (8,830 to 10,600 cubic feet), together with the ammoniacal liquor and tar. When turf and wood are distilled, the resulting products are gas, water charged with acetic acid, with small portions of ammonia, wood spirit, and tar. By Mr. Knab's method, the products of the same materials are wholly different in character. The tar and acetic acid entirely disappear; and, instead of obtaining from coal, for example, but from 250 to 300 cubic metres of gas, he obtains the enormous quantity of from 1500 to 1800 cubic metres (50,000 to 55,500 cubic feet). The gases produced are combustible, and consist of pure hydrogen, mixed with carbonic oxide and other gases in variable proportions. These gases are highly fit for heating purposes, requiring a high temperatuae; and their direct combustion, in consequence of their richness, gives a temperature from twice to two and a half times greater under similar conditions, than carbonic oxide produced directly from the conversion of the carbon of coal by the air. The gas thus produced, in fact, contains from 60 to 64 per cent. of nitrogen derived from the atmosphere; while the gas produced by M. Knab's process contains no nitrogen, which, of course, by its presence would much lower the calorific value of the carbonic oxide gas. In M. Knab's view, only a small proportion of the nitrogen contained in combustible matter is got by the ordinary process of distillation as ammonia; but he claims that by his method the whole of that nitrogen is obtained as ammonia, or in combination with sulphuric or hydrochloric acids, as either sulphate of ammonia or sal-ammoniac respectively.

His method of operation is as follows: An intimate mixture is made of the combustible matter with slaked lime, and the resulting mass is distilled. The proportion of lime employed for turf is about 200 parts of slaked time to 100 of turf, by weight. The distillation is carried on in the ordinary manner, and, as the matter is in the form of a powder, vertical retorts, heated externally, can be employed. The operation can then be continued without intermission, which would be impossible if horizontal retorts were used. One advantage of the process is, that in the case of turf it is only necessary to dry it in the open air. The water then left is sufficient to slake the lime, without the addition of fresh liquid. Lime is preferably employed, on account of its cheapness, as an alkaline agent; but, where convenient, soda and other alkalies may be substituted. An important point claimed in the invention is the use of the liberated gases for the production of a high temperature for metallurgical purposes, attended at the same time, however, with the retention of the ammonia in greater abundance than can be effected by other known processes.—*London Journal of Gas-Lighting.*

[Please let it be understood, that this Journal, in copying the above paragraph, cannot be considered as endorsing the statements therein. At the same time, there is no intrinsic *impossibility* in the obtaining in this way a certain *large* gain in volume of non illuminating gas free from nitrogen, and of good calorific power, a result, if realizable, of immense and peculiar importance and value, and we should deem the statement as highly worthy of being tested by experiment.—Ed.]

River Waters in England.

The condition of the waters of some of the rivers of this country, says the *Pall Mall Gazette*, is now so horrible that those who fall into them run the risk, not so much of being drowned as of being poisoned. This was the case with an unfortunate man on whose body an inquest was held by the Coroner at Salford. It seems the deceased fell into the Irwell while looking at the regatta, and according to the medical evidence the cause of his death was the foulness of the water. He had been in the river about ten minutes when he was helped out, but died in 48 hours. He was, it is stated, a teetotaller, and probably being accustomed to drink pure water, the filthy liquor he imbibed in the Irwell told upon him with double severity. His medical attendant, after detailing the ailment from which the deceased died, and which were caused, he said, by immersion in the water, mentioned that many of his (witness's) patients were suffering from illness caused by inhaling the noxious gases of the river while they watched the regatta crews practising. The jury returned a verdict of accidental death; but death under such circumstances can hardly be called an accident.

It is a positive certainty that any person who even strolls on the banks of the Irwell, incurs the danger of death by disease, while those who fall into what are termed its "waters" might as well plunge into a bath of prussic acid. This is a distressing state of affairs to any but those who contemplate suicide, and who, of course, delight in the double deadliness of this filthy river. There will also be considerable amusement in intemperate circles, at this additional proof—if, indeed, any were needed—of the dangers to which water drinkers are exposed; nor can there be any doubt that many persons are driven to drink adulterated gin and beer in despair of obtaining pure water.

Decline of Medical Study in France.—The *Union Medicale* says that in France the number of medical students, as well as that of practitioners, is on the decline, the medical recruital, both in civil and military life, becoming more and more difficult. Medical studies have now become so long and laborious (the physical and chemical sciences being now far more than mere auxiliaries, and forming an important part in the preparation for examinations) that the student, after his laborious and costly career, finds, on getting into practice, that he has no effective protection from the encroachment of charlatans and parasites.

Gems and Generalities.

The average car-horse lives four years after startfng in the business, and wouldn't live half that if he had sense enough to commit suicide.

Some profane and objectionable party calls Mr, Bergh's attention also to the fact that a number of Milwaukee men pack their furs away in snuff during the summer. Hundreds of moths have sneezed their heads off in consequence.

Deplorable.—Some 200 blast furnaces in various sections of the country have supended operations, and the workmen, on the eve of a severe winter, are thrown out of employment.

The travelling correspondent of one of our newspapers points out as a curious and significant fact that to-day old Babylon and Nineveh are lighted with American petroleum.

The Great Bridge.—During the last month it was reported that the Brooklyn tower is now 200 feet high, with 26 feet more to be added. The New York tower is 200 feet, with 76 feet more to be added. The work on the anchorage is progressing, but the tower work is stopped for want of stone.

Market Summary.—To feed New York and its adjacent population requires annually 600,000 head of cattle, 800,000 sheep, 1,000,000 hogs, 2,000,000 barrels of flour, and 800,000 barrels of corn and rye, with milk, fish, fruit, vegetables, and groceries to correspond. The number of baked beans consumed in Boston no man can tell.

Tree Planting.—In Switzerland law compels every newly married couple to plant six trees. and, two on the birth of every child. They are planted on commons and near the road, and being mostly fruit trees, are both useful and ornamental. The number is ten thousand annually.

Iron Pipes.—Though these are times of peace, they are by no means "piping times," probably even in the oil country. But we nevertheless have the following: Dennis Long, of Louisville, has orders for over 200 miles of gas and water pipe. He is now running two shops, and gives employment to over 500 workmen.

Per Contra.—From Cincinnati, on the other hand, we heard that Gaylord & Co., Newport, Ky., notified their workmen that owing to the dullness of times and competition, they would reduce their wages 10 per cent., on which the workman, 250 in number, ceased work September 17. and the factory was closed.

Luminous Observations.—The Titusville *Herald* wants to know, "Is there anything more trying to the soul of a man than to find that his quarterly gas bill exceeds the highest figures his prolific imagination had whispered?" Yes, there is, replies a scoffer: It is to have your wife come home from the country and find that bill, and sniff out a remark to the effect that "you said that you went to bed early while she was away."

Much in Little.—The gas-house (often conjoined with the patent office) is not without its votaries in ecclesiastical circles. One of the latest patents of Rev. G. H. Forbes, Broughton, Northamptonshire, is for a new or improved compound for use as fuel or for the manufacture of gas for heating and illuminating purposes, capable also of being used in the production of a material suitable for the purification of gas. This relates to a combination of chalk or the refuse lime of gas works, or its equivalent, with a mixture of common salt and saltpetre, or nitrate of soda, or its equivalent, or with common soda or its equivalent, with or without tar or similar bituminous substance; the equivalent of the whole being, we fear, expressible mathematically by the formula—$x=$".

Warning.

Crace Calvert, the well-known chemist, died of typhus fever, caught in Vienna.

Crace Calvert of late improved the manufacture of carbolic acid for disinfecting and preventing disease caused or aggravated by dirt, and which has rightly been termed the dirt-fever. Mr. Calvert had gone over to Vienna to introduce and spread the sale of his carbolic acid in its various forms as a soap, as a fluid, as a corpuscle, and also as a powder. He believed firmly in its power to prevent disease. Alas! he did not prevent or cure in his own case.

The lesson to be learned from this great loss and sad case is, do not put too much trust in disinfectants, as putrid cesspools and stagnant corrupted atmospheres will kill in spite of disinfectants. A city with corrupting refuse about and beneath the houses is a city of death.

In 1863 we, from personal observations, wrote thus: "There must be other deadly agents in operation in Vienna if the annual death rate, officially reported, be correct. In London, on an average of ten years, twenty-four persons out of every thousand die each year; and this is greatly in excess of some of the healthiest parts of England (at Eastbourne, for example, only fifteen persons out of every thousand die each year); so that if the population be taken at 580,000, which is probably correct, 14,500 die every year merely because they reside in Vienna instead of London."

* * The amount of loss during the exhibition year alone, through the unhealthy state of the city, which kept away visitors, and made the exhibition a failure financially, was far greater than would have been expended in rendering the city fit for healthful residence.—*London Builder.*

Testing Steam Gauges.—That will be an expensive gauge which government is to have in one of the towers of the Smithsonian Institute, with its costly column of mercury one inch in diameter and 150 feet in height. It is to be the standard gauge whereby all manufacturers of steam pressure-gauges, and all supervising inspectors, may test the correctness of the instruments which they make or use. By means of this apparatus any gauge may be subjected to a mercurial pressure of 800 pounds to the square inch, and as it is to be constructed without regard to cost, it will be as nearly accurate in its graduations as human skill can make it. But as it cannot be expected that every gauge hereafter manufactured or now in use can be sent to the Smithsonian Institute, for the purpose of being tested, there will have to be many other standard gauges—*fac similes* of the government one—erected in different localities, so as to leave no excuse for neglect or doubt; and when these standard gauges have become readily accessible, those who are found running their steam machinery with incorrect gauges should be severely dealt with.—*Technologist.*

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MONDAY, NOVEMBER 2, 1874.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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THE AMERICAN GAS-LIGHT ASSOCIATION—A MEMORABLE OCCASION.

We have the great pleasure of now announcing to the public and to those of the gas profession throughout America who were so unfortunate as to be prevented from attending, that the second regular annual meeting of our new gas association was in every way a most gratifying success; and that the establishment, on a permanent and national basis, of this grand and beneficent institution, cannot any longer be deemed problematical.

The Association convened on Wednesday, the 21st of October, at the Polytechnic Institute in Livingston street, Brooklyn, Gen. Chas. Roome the President, in the Chair. The roll of those recorded on this occasion counts up 78, but numbers were in attendance from time to time whose names, to our regret, do not appear on our record. On a general survey of these names, some very gratifying facts appear. Thus, for example, two delegates come to us away from the far Pacific strand; two Canadian cities are (most worthily) represented; southern men came from Georgia and Virginia; New England, notwithstanding her own local association, has sent us no less than thirteen members—one sixth of the whole number, so far as put on record—and a most admirable and desirable representation, as all will confess; above all, our western friends, spite of the good reason they had for complaint last year, of apparent inhospitality and neglect, have by no means failed us, there being from west of the Alleghanies also thirteen names, the same as from New England. All honor to these gentlemen for throwing overboard, even under provocation, sectional jealousy; which could but sow dissension in a profession that should be a unit. From this, more than all, we augur a future of prosperity for this Association.

It should also be pointed out, as in marked contrast with last year, that among the Metropolitan companies, including even the suburban cities in New Jersey, probably not more than two, of any importance, were unrepresented.

On this occasion no neglect or inhospitality can be imagined. The Brooklyn Companies took the matter in hand with enthusiasm. The modestly so-called "lunch" on the 21st, according to the accounts we have, was really an elegant banquet, at which there sat down nearly 100 guests.

Transportation, in carriages, was furnished *ad libitum* to the members, and, they visited thus, in a body, many points of interest to them in Brooklyn. It is due to Mr. C. H. Stoddard, Secretary and Treasurer of the Metropolitan Gas-Light Company of Brooklyn, to state that this department of hospitalities, so well carried out, was committed to his personal charge.

The change in the title of the Association, is one we have ourselves strenuously urged, and one which may be taken as implying a standing invitation, among others, to Canadian members of the fraternity to join equally in the work; as meaning, in fact, that—

"The whole boundless Continent is ours."

In the grand meetings that are to come, we count on representatives from the West Indies, Mexico and South America.

Much of the time of this meeting was taken up in the necessary discussion of the numerous points arising out of the amended Constitution that has been adopted, and which we give in this issue—this occupying indeed almost the whole of the first day. On the second day, however, there was found time for most important communications and interesting discussions, though from lack of opportunity other purposed papers were not presented. Enough work was done, nevertheless, and a kind of work, of no small significance in the progress of Gas Science.

The first communication was from Mr. Walker, of Milwaukee, on Sunday Labor; in which convincing arguments were presented. Mr. Hyde, Engineer of the Cleveland Gas-Light and Coke Company, read a paper upon Iron Purification, as practised by him. Capt. White, of the Citizens Company of Brooklyn, and Mr. Edgerton, of Fort Wayne, Indiana, both made most important communications upon the great overshadowing question of petroleum and naphtha for gas purposes. Prof. H. Wurtz, Editor of this Journal, communicated some new methods of gas analysis calculated for use in the gas house, illustrated and demonstrated by experiments. Of all these things, hereafter.

The opening address of the President, General Roome, President of our largest Gas Company, the Manhattan—who is probably the oldest, and certainly the most experienced member of the American gas profession—deserves, and will command, the greatest attention. Its style is fully characteristic of the man, of his determined energy and practical power; his honesty and open integrity; and teems with a certain native nobility which all who know him recognize. It is essentially, however, a voice from the past, and deals with the present and the future but in one aspect, that of the factitious and hypothetical antagonism between Gas Companies and the public, which has absorbed him throughout life, and which he believes must needs endure forever. Younger men may naturally look more hopefully to the future, and think that influences now well at work, and which this Association itself will immensely forward, must quickly overcome these fiends of discord. Science, we may claim, should certainly do this much for us, if we faithfully follow her behests. She is now rapidly gaining a paramount influence over the public, certainly not less in America than elsewhere, and this influence is, and will be, more and more, active on the side of truth, justice, peace and good will among men. If the gas profession shall ally itself with science thoroughly, openly, earnestly and industriously as we believe it is about to do, the public will quickly know it, and will be content.

Indeed, does not our eminent President himself foreshadow all this, in his wise closing counsels. "Let us have no secrets from each other or from the public?" What is this but an overture to Science? It is her mission and function to penetrate all secrets, and things misunderstood, to investigate them and to reduce them to the popular comprehension.

We have good hope that General Roome may himself yet live to see the time when a large majority of the educated and intelligent public will trust, as they will have reason to trust, with unquestioning faith, to their being served with gas, in quantity and in quality up to highest standard that the skilful application of the most advanced chemical science of the day can attain; and when these universal and incessant suspicions and murmurings which have done such constant violence to his own conscious rectitude of purpose, and so embittered his great professional career, will become almost altogether exceptional, and things of trivial significance.

A "SMELLING COMMITTEE."

We called attention over three months since to the announcement that Assistant Sanitary Superintendent Janes and Inspector Goldschmidt, of the New York Board of Health, had been commissioned to study the gas works and other putative sources of odors which offend the nostrils of those who dwell in Gotham. The public prints have announced, for more than a fortnight, that this report has been rendered, though we have as yet sought in vain for any complete account

thereof, and even sighed in vain for replies to "begging letters" addressed to the powers that be.

Should we be among the favored ones in this respect, we trust to present this report to our readers. In the meantime the following slight morceaux, culled from the reporters of the daily press, must suffice as harbingers of the joys to come.

Regarding the bad odors, which created intolerable nuisances on the east side last summer; it was claimed by Dr. Janes that some were due to bad sewerage, and that the factories at Greenpoint and Hunters Point caused disagreeable smells when the wind blew from Long Island. Inspector Goldschmidt reported on an inspection of the gas works at the foot of East Twenty-first street, at the foot of East Fourteenth and West Fifteenth street, at the foot of West Forty-second street, at the foot of East One Hundred and Eleventh street, at the foot of East Eleventh street, at the foot of East Ninety-eighth street, and at the foot of East One Hundred and Thirty eighth street and Railroad avenue and Bronx river.

The odor of escaping gas—a nuisance which cannot be avoided—was detected at each place, and it was recommended that the companies be requested to reduce leakage to a minimum. Another nuisance is created by the accumulations of tar and ammonia which are sold to persons outside of the gas business. The nuisances on the east side were asserted to be augmented by the smell of the Williamsburgh Gas Works, in which the dry lime process is used, and that of the Greenpoint and Hunters Point Oil Works. The New York Ammonia Works at Avenue B and Twentieth street, which utilize the refuse of gas works, are also the source of various odors, although the apparatus used is the best that can be devised.

How "the odor of escaping gas" can be detected at the foot of East Ninety-eighth street, (the Union Works) where no gas has yet been made—indeed, we believe, no retorts yet set—is certainly worthy of inquiry. Has not the painstaking Inspector possibly caught the "spicy gales" from Harlem marsh mud?

The testimony of the nose, as the darkey pathetically complained of the white man, is often "mity onsartin."

In reference to the Sewers, Dr. Janes says—what all know already who are knowing—that they are only washed with water, and the theory is that by this means they are thoroughly cleansed. In a dry season, however, when the water-supply is limited, the organic matter is not removed from the sides and bottoms of the sewers. Here it clings, and becoming partly dried as the water recedes, putrid gas is developed by its decomposition. This gas penetrates by drains into residences and causes offensive odors, which become the subject of complaint to the Board of Health.

Of the East Twentieth street Ammonia Works Dr. Janes says that they are "most active in producing offensive odors." The newspaper quotations of his remarks on this head shed considerable darkness thereon, and we shall not of course do the gentleman the injustice to quote them all. One interesting fact is stated, that the escaping gases from these Ammonia Works have been addicted to a charming habit of somehow getting into the sewers also, and thus penetrating far and wide into houses, cellars, etc., together with the sweet and familiar savors of putridity which are wont to prevail, and to which the people are so accustomed, like the eels which we read of in the pages of romance, which had become so used to being skinned alive; or like King Mithridates, who schooled his stomach to digest deadly poisons. No wonder they complained.

Offensive odors complained of by inhabitants on Madison avenue were asserted to have been traced to the Hunters Point petroleum works. Five or six times offensive odors were traced to the rendering and fertilizing works across the East River; but the results of the investigation show that the New York Ammonia Company was the source of most of the offensive odors in the eastern district of the city last Winter and the early part of last Summer.

As our readers are aware, this is substantially what the Editor of this Journal told the gas-public six years ago. His original discovery of this fact will of course be unknown to the general public; but the readers of this Journal may mete him out a limited meed of justice.

COAL-MINE INSPECTION.

It has come out before the public that at their last winter's session the Pennsylvania Legislature authorized an inspection of the *bituminous* coal mines of that State. The gentlemen appointed by the Governor to carry out that duty, we do not know by reputation, and especially do we not find among them any competent expert in chemical science—whereat we are much discontented; as it would appear obvious that the questions involved, of ventilation, blasting agents, safety lamps, extinguishing fires, etc., are such as none but a very skilled chemist should be entrusted with. Why, also, is there no mention made of the anthracite mines, in some of which so much trouble has occurred from fire, fire-damp, etc.? The gentlemen appointed began their duties on the 20th of July, and will report to the next Legislature. The Resolution of the Legislature was as follows:

—That the Governor is hereby authorized to appoint a Board of Commissioners, to consist of three persons, who have a reputable practical knowledge of mines and mining throughout the bituminous coal regions of the State, whose duty it shall be to carefully and fully investigate the present condition of bituminous coal mines, and ascertain whether the same are properly drained and ventilated, together with such other matters connected therewith as are calculated to preserve the health and secure the safety of persons employed therein; said Commissioners to report the result of said investigation to the next Legislature.

—Section 2.—That said Commissioners shall have full authority to enter, unmolested, and and all coal mines throughout the State, and shall be empowered to make such examination therein as in their judgment they may deem expedient; *Provided*—That the time occupied by said Commissioners in said investigation shall not exceed one hundred days.

R. P. Rothwell, now the very able co-editor, with Prof. Raymond, of the *Engineering and Mining Journal*, read an important paper last May, to the *American Institute of Mining Engineers* at St. Louis (which we wish it were possible to transfer bodily to our columns) on the "Mechanical Preparation of Anthracite." After showing the great proportion of loss of the coal in the seam as it stands, as treasured up and committed to us by God as a sacred trust—the most precious of all that He has stored up from olden time, in His subterranean treasury-crypts—a dead loss and waste, due to our sinful apathy and ignorance, of from 25 to 50 per cent., according to the dip of the seam—he goes on to describe, in an accurate and interesting style, the construction and working of the huge "Coal Breakers" which dot the anthracite country, and explains the *further loss* in breaking the coal for market, of 20 to 40 per cent.

Mr. Rothwell then proceeds as follows:

"The whole cost of the waste in preparing anthracite should be more fully investigated by the large companies that now control that trade and own, practically, the whole field. A series of carefully conducted experiments would undoubtedly lead to a very important saving by determining the best machinery for breaking and cleaning coal, and the most economical manner of carrying on the work. It must be admitted that the anthracite coal must be broken to small sizes before it can be used without an artificial draft, and the system of breaking at the mines with specially adapted machinery is undoubtedly the best; but it must also be evident that an immense improvement in the direction of economy may be made by a thorough investigation of the subject, inducing the adoption of improved machinery."

Now in one point we cannot concur fully with the writer. It is obvious to us that the fundamental fault in this case is a general one. As the world wags, the public generally is to blame in this case, and that portion of it which is most immediately concerned is the public of Pennsylvania, which should interpose, through its legislature at once to crowd down by force this lavish dissipation of the natural wealth of the State! From an item we publish to-day it appears that ten years hence—in 1884—our total output of coal will be more than one hundred million tons, of which half will be Pennsylvania anthracite. If this fifty millions is but 70 per cent. when broken, of what is mined out, and the latter but 70 per cent. of the coal veins as they stand, it represents, in available carbon, somewhat less than one-half of these veins. Our thought is that if Pennsylvania would now create such a Commission as the one above referred to, but composed of the highest scientific mining, mechanical and chemical talent in the land, with funds to experiment with efficiently, it would be reasonable to expect that in much less than ten years, approved methods would be arrived at, by which the above anthracite waste could be reduced one-half; which, at a valuation, at the mines, of only a dollar a ton, would be 25 millions a year saved by that State. "A penny saved is a penny earned;" and the adage is applicable to every penny of this 25 millions. Further words seem superfluous; except to hint that this is all just as applicable also to the bituminous and gas coals, and coals for coke; of which Pennsylvania gives us so large a proportion; which of course would save many additional millions.

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A City Without Light.

It is reported by cable that by the burning of the city gas works of the city of Dublin, Ireland, not only is a large and serious loss of property incurred., but the city is left in darkness, so far as gas-lighting is concerned, and the inhabitants must rely chiefly on candles, the use of kerosene oil not being common in that country. Such a misfortune as this befalling a large city can now be appreciated by those who have not experienced it. Three years ago the upper part of New York was left in darkness for several nights, owing to a breakage in the gas mains, and the fears and tribulations of those affected by it were many, some of them ludicrous, and not a few serious.

The danger from thieves and night prowlers is, of course, the most alarming, since these criminals would naturally avail themselves of so favorable an opportunity of pursuing their nefarious calling. Foot-pads would abound in the streets, and those compelled by business or other engagements to be in the darkened thoroughfares, would be in serious danger of being robbed and even murdered. It will thus be perceived how much we are dependent upon gas-light for safety as well as comfort and convenience, and how little we really appreciate the importance of this invention. The many uses of water and gas by the general public are but little considered until some untoward accident deprives us of them. And the total dependence of large cities upon elements of civilization, which their inhabitants have never learned to do without, is only manifest when we come really to consider how greatly we are indebted to them for much of what makes life comfortable and our dwellings and cities habitabie.—*The Republic, October 24.*

[In this disastrous fire, which occurred on the 23rd of last month, the damage was estimated at £25,000. Some 2590 tons of coal were also consumed.]

Impure Water.

The *Journal of Chemistry* says: Public attention cannot be too often called to the danger of using impure water in households. The origin of typhoid fever, which so frequently runs through families in city and country, is oftener in wells and springs than is supposed. In cities it is easy to understand, when aqueduct water is not supplied, how wells may become contaminated, but for many it is not so easy to see how wells in the country, among the hills, or in the green valleys, can become so impure as to become sources of disease.

Since the general introduction of aqueduct water into large cities, typhoid fever has become more common in the country than in the city, and this disease is certainly zymotic, or one which results from a poison introduced into the blood. Wells in the country are very liable to become contaminated with house sewage, as they are generally placed for convenience, very near the dwelling, and the waste liquids thrown out upon the ground find easy access by percolation through the soil to the water. The instances of such contamination which have come to our notice, and which gave rise to fevers, are numerous. The gelatin us matter which is often found covering the stones in wells affected by sewage, is a true fungoid growth, and highly poisonous when introduced into the system. It is undoubtedly concerned in the production of typhoid fever. How it acts it is difficult to determine, but it is at least conceivable that the spores of the fungus may get into the blood and bring about changes after the manner of yeast in beer. These spores, as is well known, develop rapidly by a kind of budding process, and but a little time passes before the whole circulation becomes filled with them, giving rise to abnormal heat, and general derangement, called fever. These fungoid or confervoid growths are always present in waters rendered impure by house drainage, and great caution should be used in maintaining well waters free from all sources of pollution.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

NOVEMBER 2, 1874.

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Lingan—At Mines, $2 25, Gold			0 00
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(Duty, 15 cents per ton, gold. Freight to New York $2 25, currency. Cost of above coals delivered in New York, $5 25 @ $6 00½, currency.)

Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
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Pinnicklnick	7 40	@	0 00
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American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
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Red Bank—at Philadelphia			7 60
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Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

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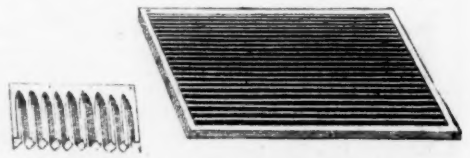

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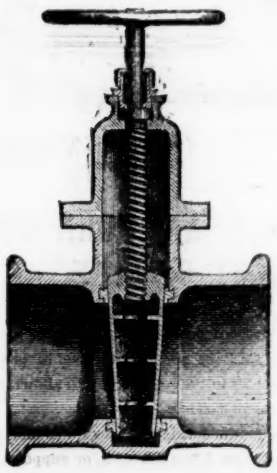

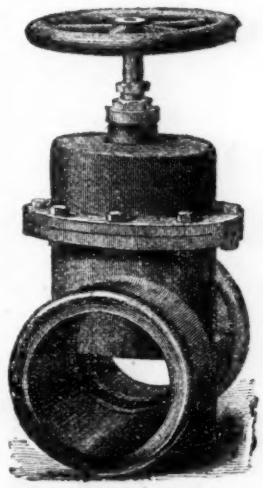

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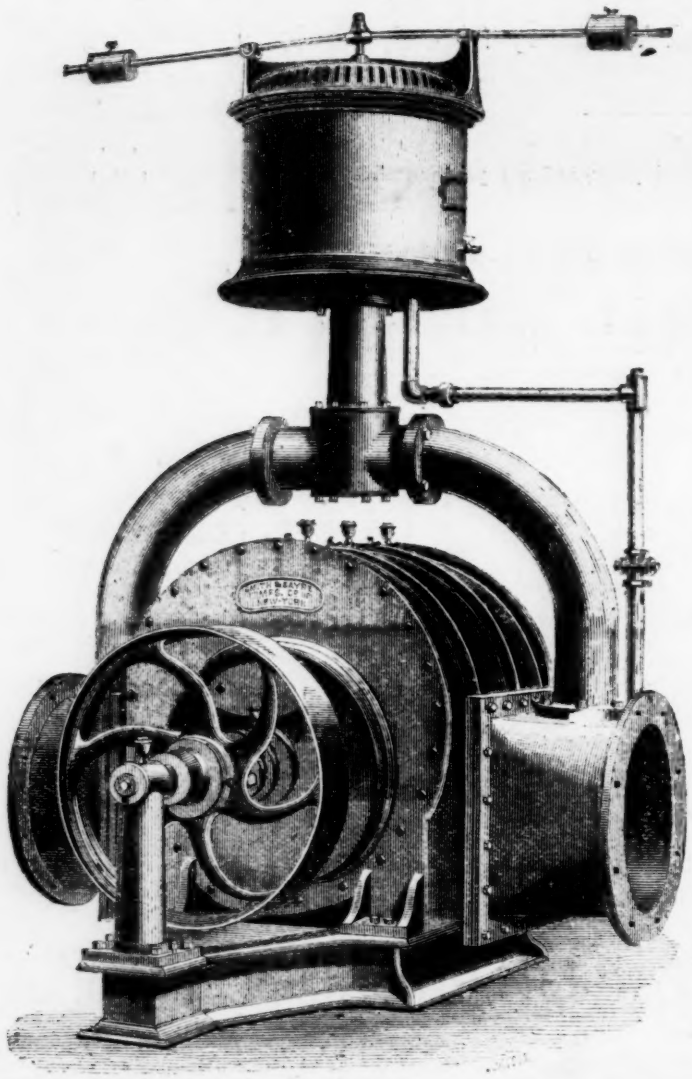

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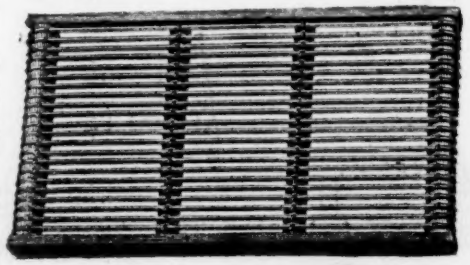

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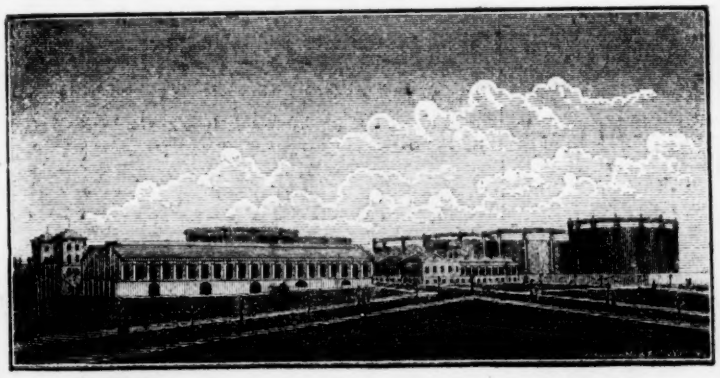

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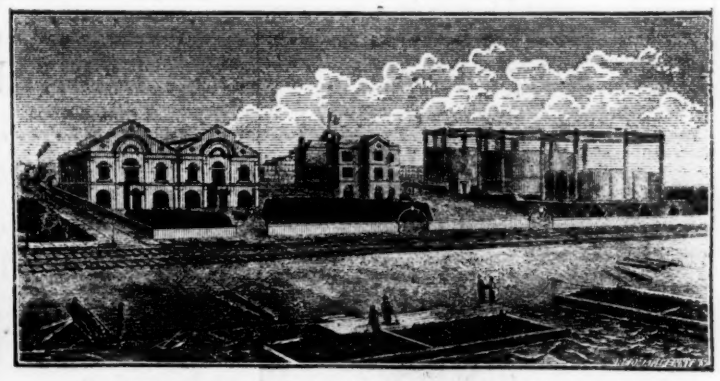

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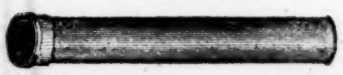

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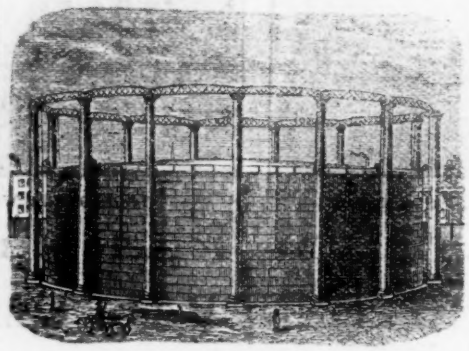

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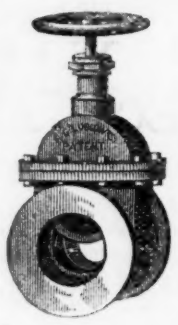

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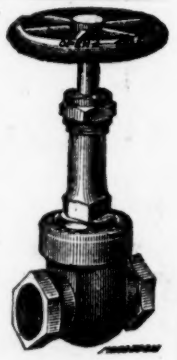

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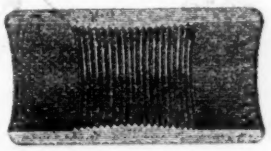

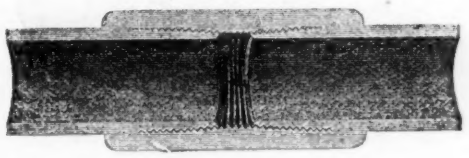

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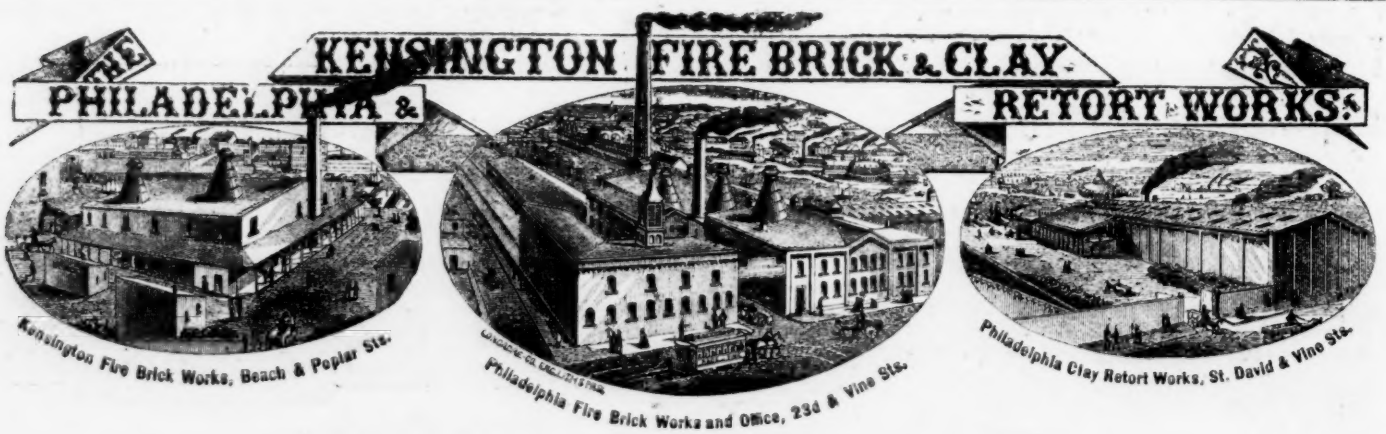
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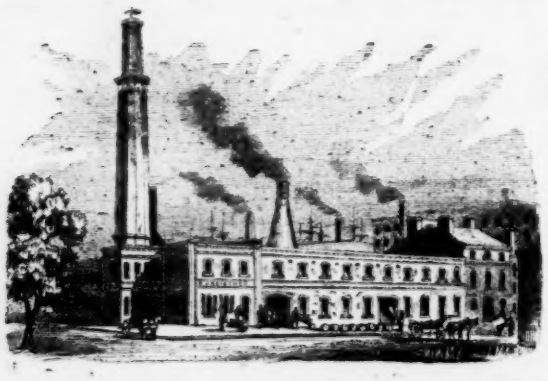

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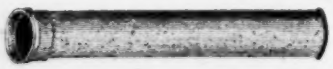

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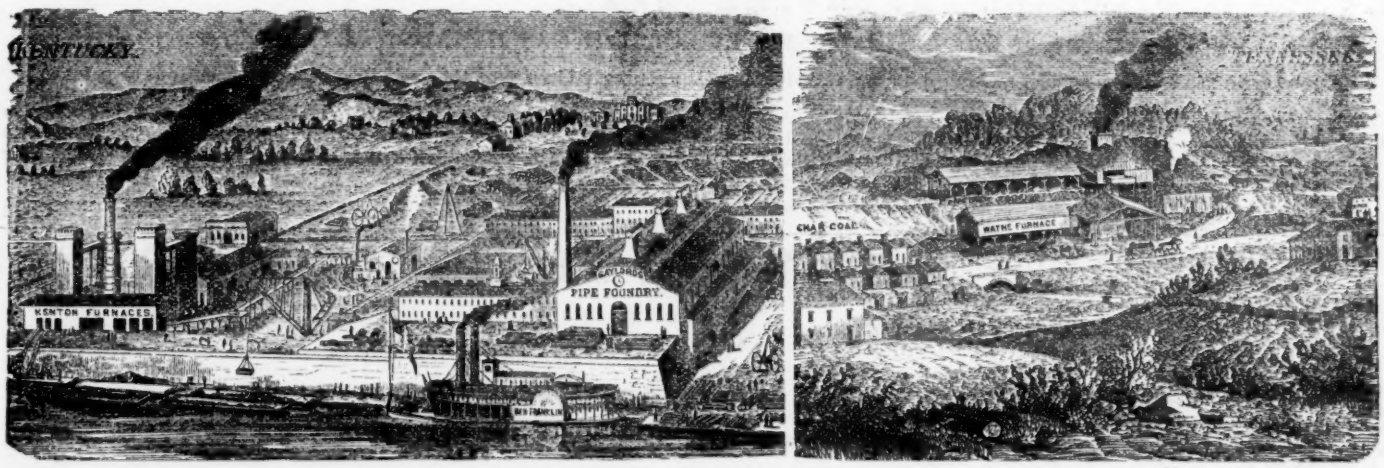

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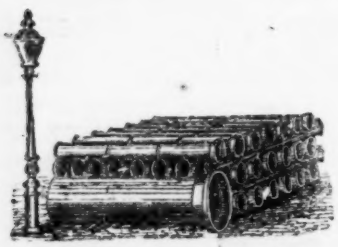

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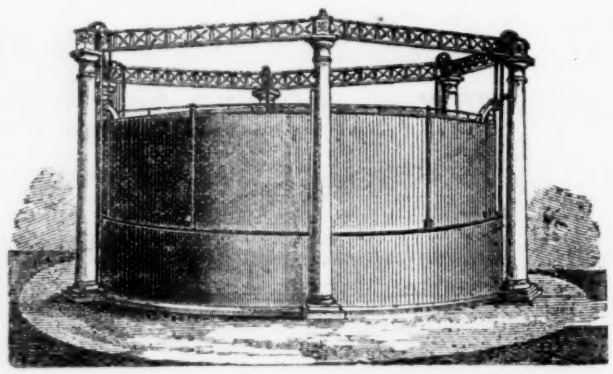

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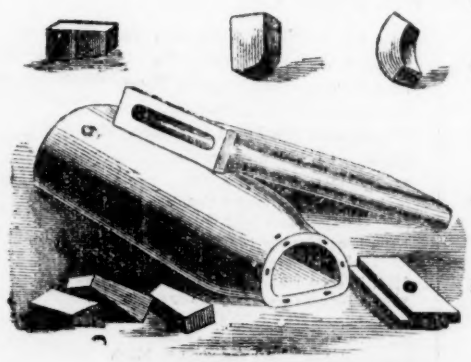

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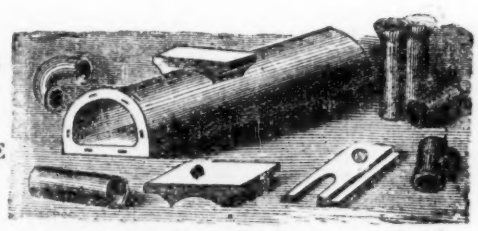

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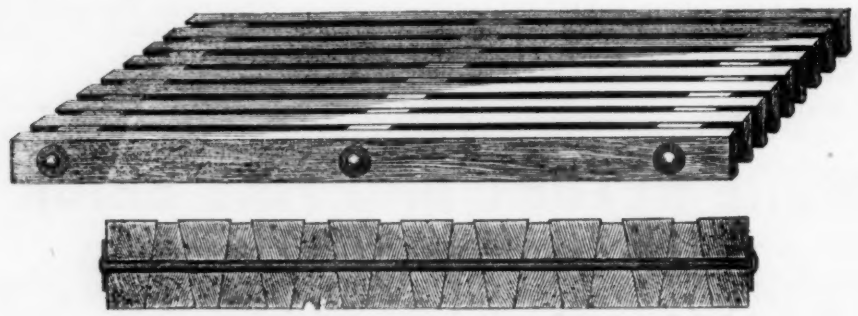

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